

# STORM WATER MANAGEMENT PLAN

ONE EAST PLEASANT STREET

AMHERST, MA

AUGUST 6, 2014

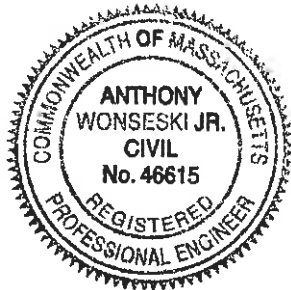
## PREPARED FOR:

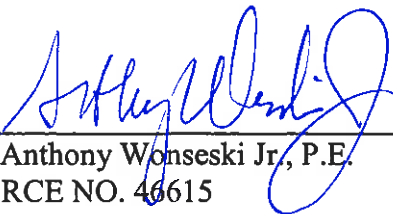
Archipelago Investments, LLC  
37 South Pleasant Street  
Amherst, MA 01002


## PREPARED BY:

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SVE Project No: G1821



  
Anthony Wonseski Jr., P.E.  
RCE NO. 46615

  
Date

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## **1.0 Introduction**

This Storm Water Management Plan (SWMP) documents drainage impacts associated with the proposed redevelopment at One East Pleasant Street; Amherst, MA. The property is approximately 35,375 square feet in size and is located at East Pleasant Street and North Pleasant Street. The property is currently a commercial/retail use and is known as the Amherst Carriage Shops. The proposed multi-use redevelopment consists of commercial space at ground level with upper floor residential.

Refer to the vicinity map on page 4 for the specific location of the project.

## **2.0 Existing Conditions**

### **2.1 Site Characteristics**

The site is an active commercial/retail development. The surrounding area consists of a parking area to the North; West Cemetery to the East, and commercial building and parking to the South. Storm water runoff from the property collects in two catch basins within the parking area and conveys runoff via underground pipe the Amherst Municipal Storm drainage system located in East Pleasant Street.

Refer to page 5 for an aerial plan of the existing property.

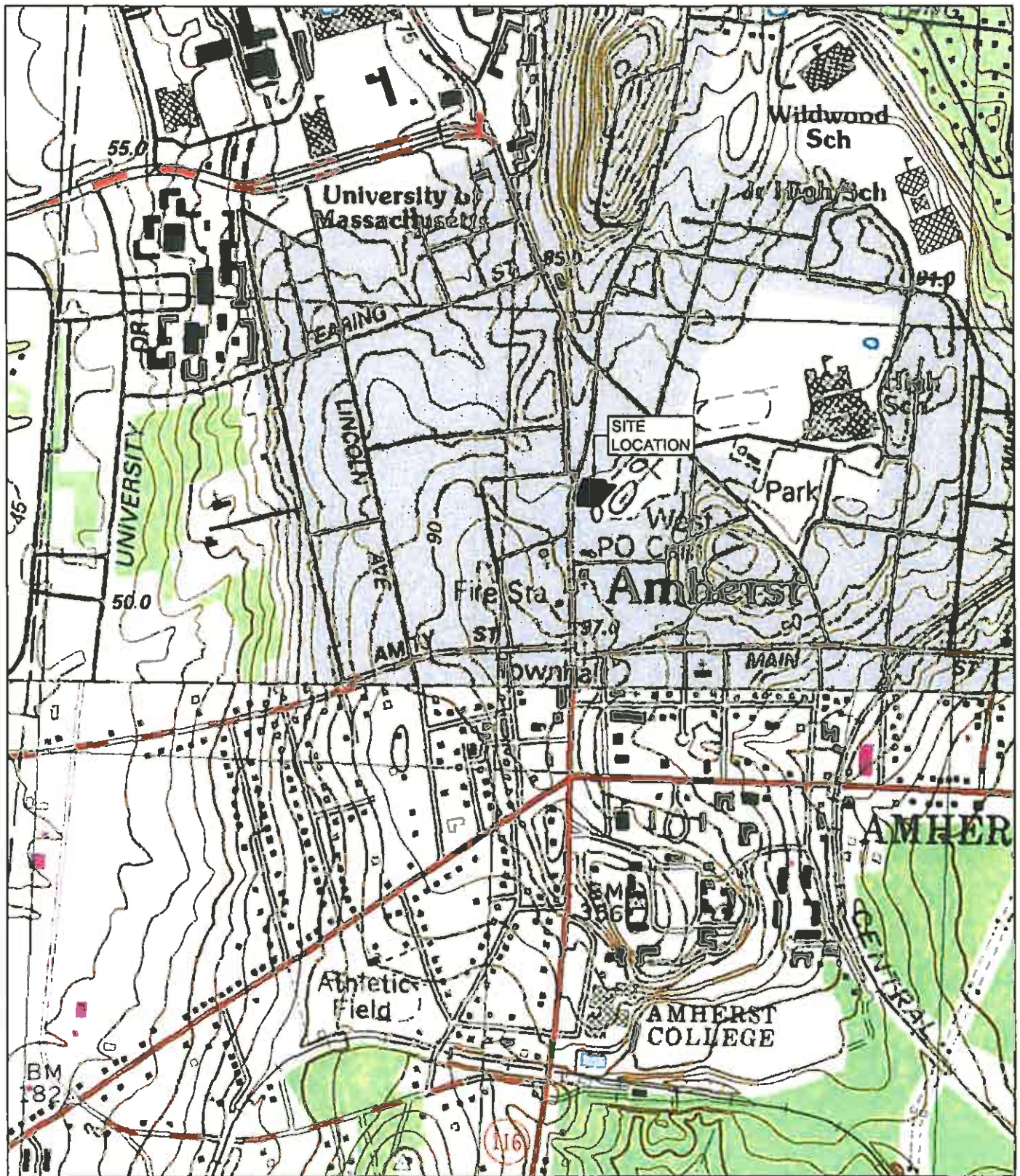
### **2.2 Soil Characteristics**

Review of the Natural Resources Conservation Service Web Soil Survey indicates the project area is primarily Hinckley-Merrimac Urban Land Complex. These soils are classified as A Soils. Refer to page 6 for a copy of the soils map.

### **2.3 Floodplain**

Review of the Flood Insurance Rate Map (FIRM) for the Town of Amherst, Massachusetts, Community Panel Number 250156 - 0005 C, effective date: December 15, 1983, indicates the subject property falls within zone C: Areas of minimal flooding.

Refer to page 7 for a copy of the Flood Insurance Rate Map (FIRM).



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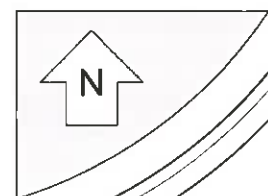
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## USGS VICINITY MAP

1000  
500  
0  
GRAPHIC SCALE: 1" = 1000'



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SHEET

4



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## EXISTING AERIAL SITE MAP

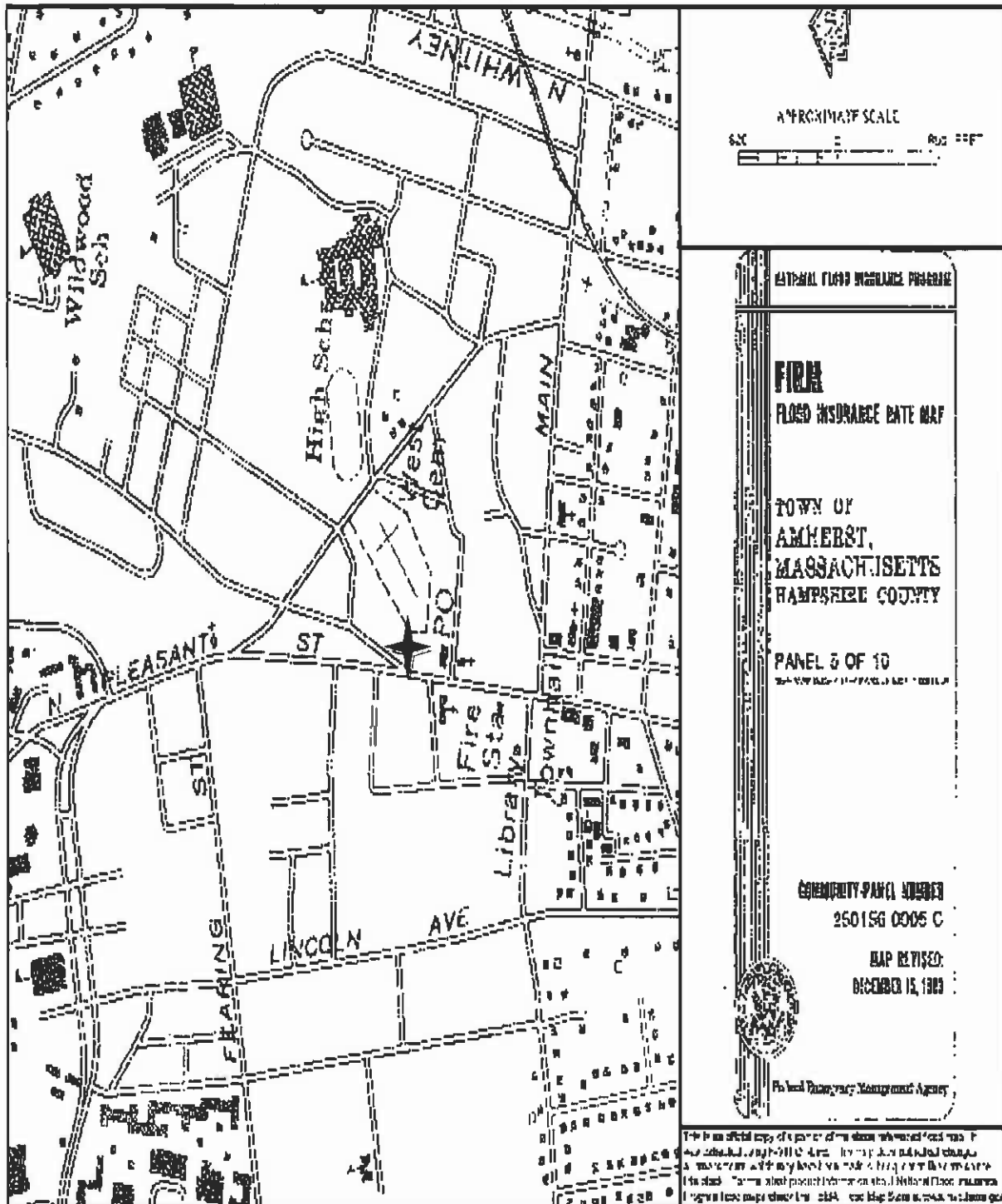
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G1821

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07-AUG-14

SHEET  
**5**

## FLOOD INSURANCE RATE MAP



## 2.4 Existing Hydrology

The drainage area studied for this project is approximately 35,375 square feet in size. Hydrological calculations indicate the expected runoff generated from the existing commercial property. The generated runoff drains to onsite catch basins. The catch basins connect to the municipal storm system located in East Pleasant Street.

Refer to Pocket #1 for the existing conditions hydrology exhibit to designate areas used for the analysis.

The table below summarizes the results of the existing runoff calculations for the property. Flow is represented in cubic feet per second (CFS).

Design Storm	Existing Runoff
Q2	1.49
Q10	2.76
Q100	4.41

Note:

Existing condition runoff accounts for runoff expected to be generated from the site as it is today.

Refer to Appendix A for hydrology calculations.

## 3.0 Developed Conditions

### 3.1 Design Objectives

The objective of this SWMP is to analyze the pre and post development storm water runoff conditions and impacts to downstream properties for the proposed building development. The Amherst DPW has expressed concerns about the existing watershed during previous discussions. This watershed has experienced flooding from past large storm events. In order to mitigate a potential increase in runoff from this development the design will include Low Impact Development (LID) design measures. In order to reduce flow from this development, the project will install a green roof along with other impervious areas will increase the impervious area and reduce the redevelopment runoff.

### 3.2 Developed Hydrology

Refer to Appendix A for Hydrology Calculations.

Refer to Pocket #2 for Redeveloped Hydrology Maps

### 3.3 Summary of Post Development Hydrology

Design Storm	Existing	Developed w/ Green Roof	$\Delta$
Q2	1.49	1.21	<b>-.028</b>
Q10	2.76	2.42	<b>-0.34</b>
Q100	4.41	4.05	<b>-.036</b>

## 4.0 Conclusion

This Storm Water Management Plan has been prepared to document the storm water impacts associated with the redevelopment of One East Pleasant Street. Analysis was performed for the 2, 10 and 100 year design storms. The analysis shows that through careful site design of the project, the proposed redevelopment will not adversely affect existing downstream utilities or properties. The proposed storm drain facilities will improve expected runoff conditions utilizing LID design principles and implementing a green roof.

Standard No. 1 – There are no new storm water conveyances (e.g. outfalls) discharging untreated storm water directly to or cause erosion in wetlands or waters of the Commonwealth. On-site storm water from impervious areas will drain to an existing municipal storm drain facilities.

Standard No. 2 – Redevelopment project results in no increase in peak discharges from the proposed redevelopment.

Standard No. 3 – Review of the Web Soils Survey indicates the surface soil at the site is of a hydrologic classification of A. Actual soil evaluation have not been performed at this time.

Standard No. 4 – TSS removal requirements will be improved for this redevelopment project due to the installation of a green roof and the installation of a deep sump catch basin.

Standard No. 5 – Not applicable.

Standard No. 6 – Not Applicable. The property is not within a Zone II or interim Wetland Protection Area of a public water supply or a watershed protection overlay zone.

Standard No. 7 – Redevelopment project meets standards to maximum extent practicable under state and town regulations.

Standard No. 8 – A plan to control construction related sediment is provided. Refer to project plans.

Standard No. 9 –Owner is responsible for litter and debris pickup. Owner shall inspect onsite catch basin annually for necessary maintenance. The green roof will be maintained according to manufacturer's recommendations.

Standard No. 10 – There is no known illicit discharges to the storm water management system.



Existing Conditions



developed conditions



**Routing Diagram for G1821 One East Pleasant**  
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**G1821 One East Pleasant**

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Page 2

**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.195	39	>75% Grass cover, Good, HSG A (1S)
0.247	39	green roof and plantings (2S)
0.617	98	Paved parking and roofs, HSG A (1S)
0.565	98	roof (2S)
<b>1.624</b>	<b>82</b>	<b>TOTAL AREA</b>

**G1821 One East Pleasant**

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**Soil Listing (all nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
0.812	HSG A	1S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.812	Other	2S
<b>1.624</b>		<b>TOTAL AREA</b>

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Page 4

**Ground Covers (all nodes)**

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.195	0.000	0.000	0.000	0.000	0.195	>75% Grass cover, Good	1S
0.617	0.000	0.000	0.000	0.000	0.617	Paved parking and roofs	1S
0.000	0.000	0.000	0.000	0.247	0.247	green roof and plantings	2S
0.000	0.000	0.000	0.000	0.565	0.565	roof	2S
<b>0.812</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.812</b>	<b>1.624</b>	<b>TOTAL AREA</b>	

**G1821 One East Pleasant***Type III 24-hr 2-Year Rainfall=3.00"*

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Page 5

Time span=0.00-32.00 hrs, dt=0.02 hrs, 1601 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: Existing Conditions**      Runoff Area=35,374 sf   75.94% Impervious   Runoff Depth=1.52"  
Tc=5.0 min   CN=84   Runoff=1.49 cfs   0.103 af

**Subcatchment 2S: developed conditions**      Runoff Area=35,374 sf   69.53% Impervious   Runoff Depth=1.25"  
Tc=5.0 min   CN=80   Runoff=1.21 cfs   0.085 af

**Total Runoff Area = 1.624 ac   Runoff Volume = 0.187 af   Average Runoff Depth = 1.38"**  
**27.27% Pervious = 0.443 ac   72.73% Impervious = 1.181 ac**

**Summary for Subcatchment 1S: Existing Conditions**

Runoff = 1.49 cfs @ 12.08 hrs, Volume= 0.103 af, Depth= 1.52"

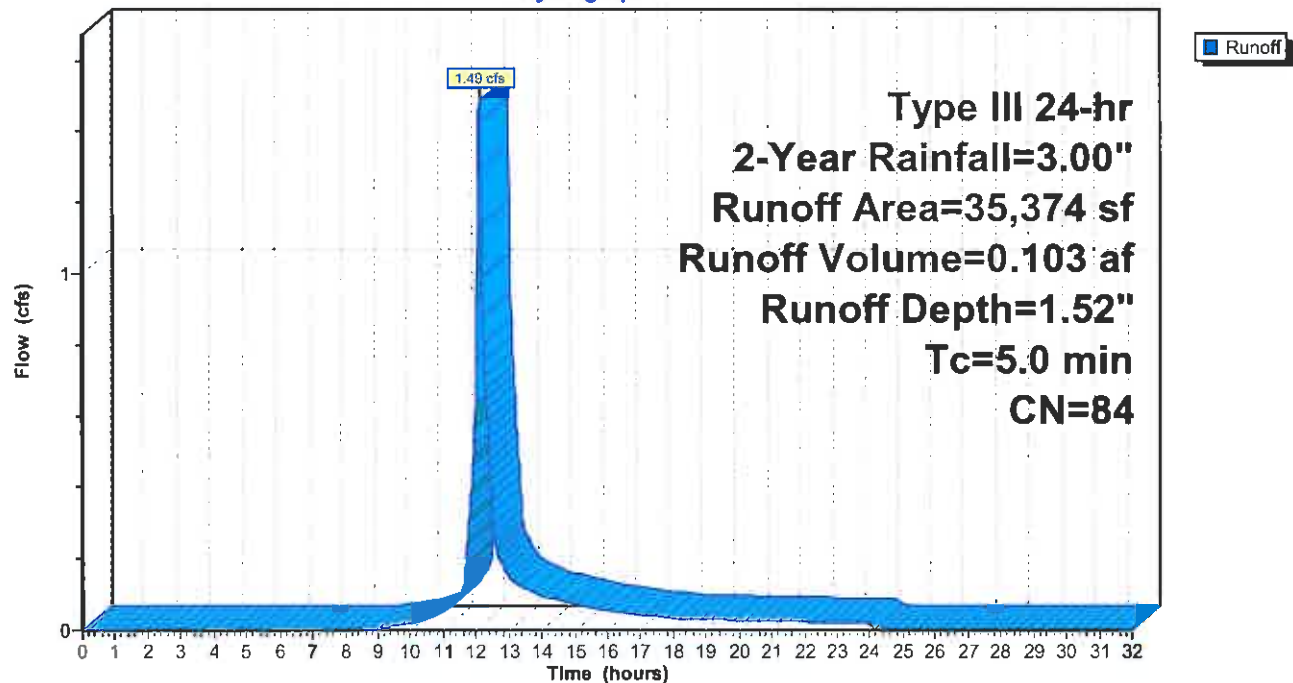
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs  
Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
8,512	39	>75% Grass cover, Good, HSG A
* 26,862	98	Paved parking and roofs, HSG A
35,374	84	Weighted Average
8,512		24.06% Pervious Area
26,862		75.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment 1S: Existing Conditions**

Hydrograph



**Summary for Subcatchment 2S: developed conditions**

Runoff = 1.21 cfs @ 12.08 hrs, Volume= 0.085 af, Depth= 1.25"

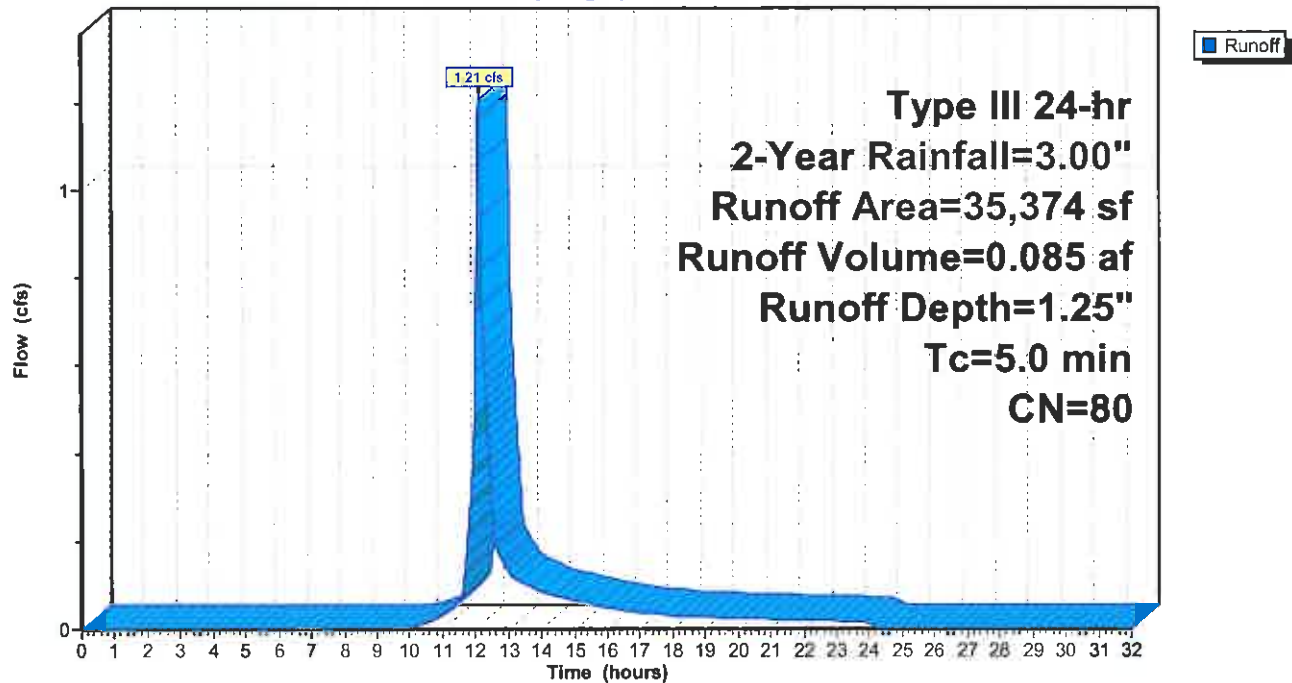
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs  
Type III 24-hr 2-Year Rainfall=3.00"

	Area (sf)	CN	Description
*	10,780	39	green roof and plantings
*	24,594	98	roof
	35,374	80	Weighted Average
	10,780		30.47% Pervious Area
	24,594		69.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment 2S: developed conditions**

Hydrograph



**G1821 One East Pleasant***Type III 24-hr 10-Year Rainfall=4.50"*

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Time span=0.00-32.00 hrs, dt=0.02 hrs, 1601 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: Existing Conditions**      Runoff Area=35,374 sf   75.94% Impervious   Runoff Depth=2.82"  
Tc=5.0 min   CN=84   Runoff=2.76 cfs   0.191 af

**Subcatchment 2S: developed conditions**      Runoff Area=35,374 sf   69.53% Impervious   Runoff Depth=2.46"  
Tc=5.0 min   CN=80   Runoff=2.42 cfs   0.167 af

**Total Runoff Area = 1.624 ac   Runoff Volume = 0.357 af   Average Runoff Depth = 2.64"**  
**27.27% Pervious = 0.443 ac   72.73% Impervious = 1.181 ac**

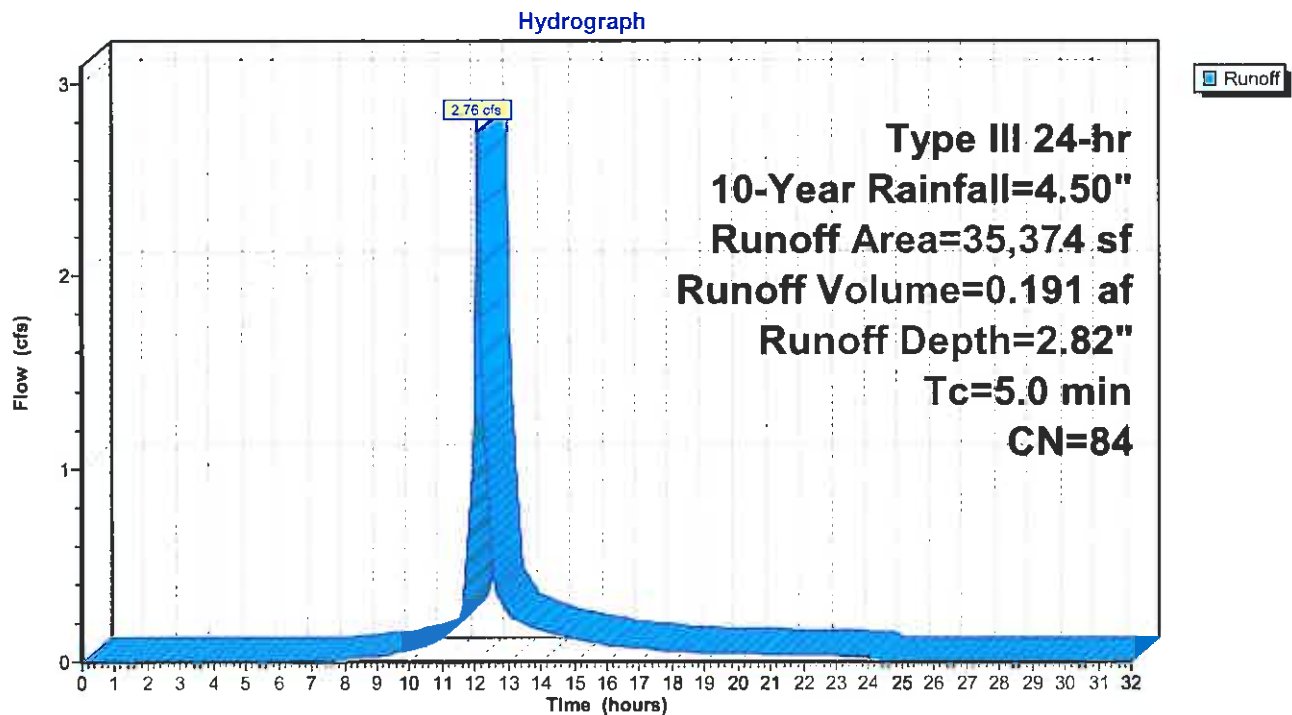
**Summary for Subcatchment 1S: Existing Conditions**

Runoff = 2.76 cfs @ 12.07 hrs, Volume= 0.191 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs  
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
8,512	39	>75% Grass cover, Good, HSG A
* 26,862	98	Paved parking and roofs, HSG A
35,374	84	Weighted Average
8,512		24.06% Pervious Area
26,862		75.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment 1S: Existing Conditions**

**G1821 One East Pleasant**

Type III 24-hr 10-Year Rainfall=4.50"

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**Summary for Subcatchment 2S: developed conditions**

Runoff = 2.42 cfs @ 12.08 hrs, Volume= 0.167 af, Depth= 2.46"

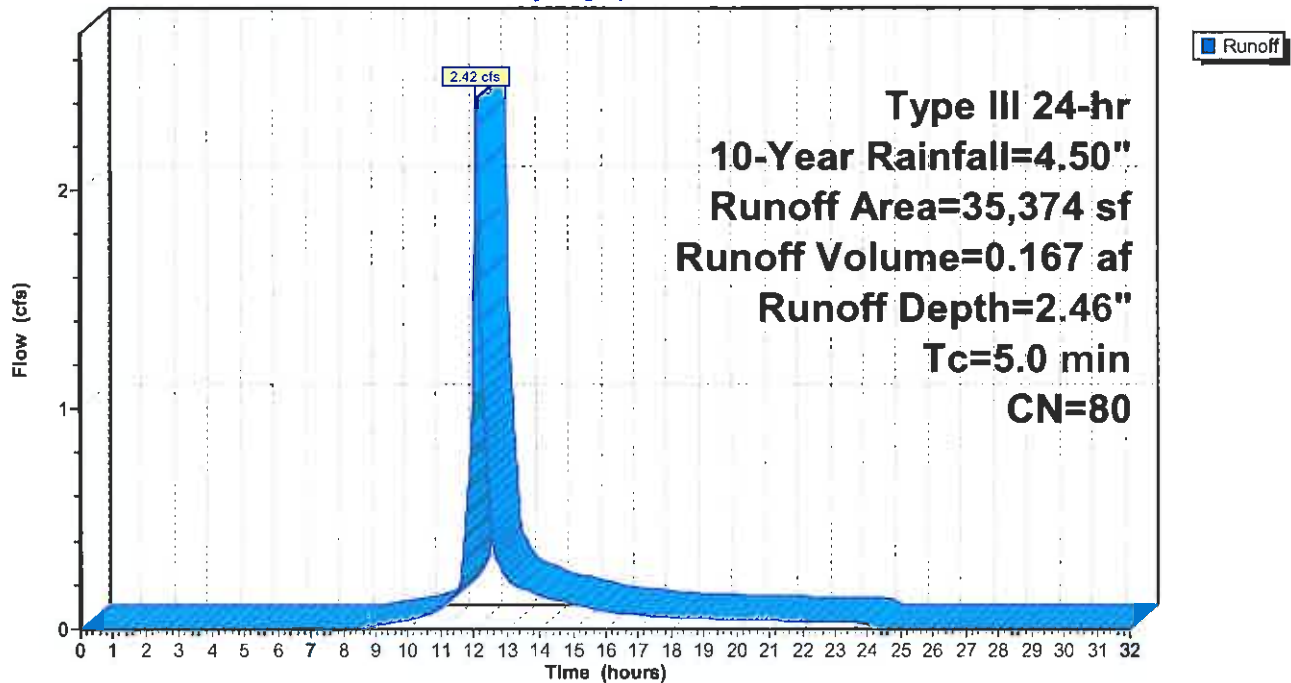
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs  
Type III 24-hr 10-Year Rainfall=4.50"

	Area (sf)	CN	Description
*	10,780	39	green roof and plantings
*	24,594	98	roof
	35,374	80	Weighted Average
	10,780		30.47% Pervious Area
	24,594		69.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment 2S: developed conditions**

Hydrograph



**G1821 One East Pleasant***Type III 24-hr 100-Year Rainfall=6.40"*

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Time span=0.00-32.00 hrs, dt=0.02 hrs, 1601 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: Existing Conditions**      Runoff Area=35,374 sf   75.94% Impervious   Runoff Depth=4.57"  
Tc=5.0 min   CN=84   Runoff=4.41 cfs   0.309 af

**Subcatchment 2S: developed conditions**      Runoff Area=35,374 sf   69.53% Impervious   Runoff Depth=4.14"  
Tc=5.0 min   CN=80   Runoff=4.05 cfs   0.280 af

**Total Runoff Area = 1.624 ac   Runoff Volume = 0.590 af   Average Runoff Depth = 4.36"**  
**27.27% Pervious = 0.443 ac   72.73% Impervious = 1.181 ac**

**Summary for Subcatchment 1S: Existing Conditions**

Runoff = 4.41 cfs @ 12.07 hrs, Volume= 0.309 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs

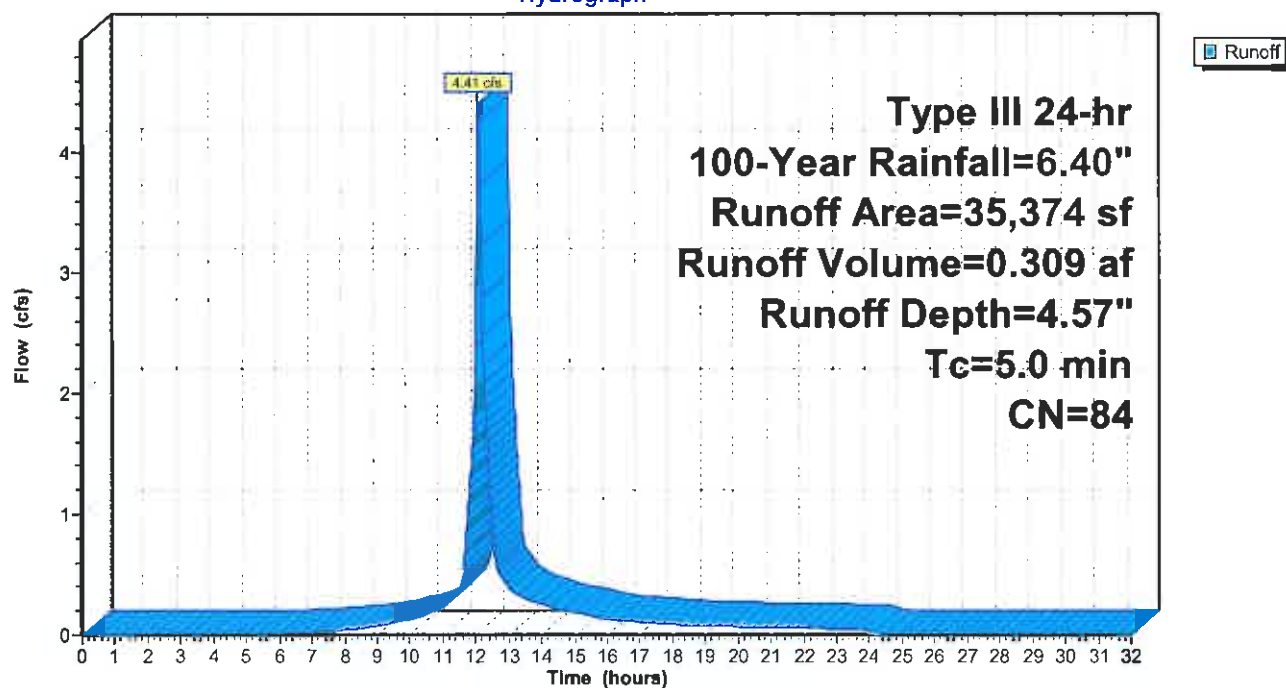
Type III 24-hr 100-Year Rainfall=6.40"

Area (sf)	CN	Description
8,512	39	>75% Grass cover, Good, HSG A
* 26,862	98	Paved parking and roofs, HSG A
35,374	84	Weighted Average
8,512		24.06% Pervious Area
26,862		75.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment 1S: Existing Conditions**

Hydrograph



**G1821 One East Pleasant**

Type III 24-hr 100-Year Rainfall=6.40"

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**Summary for Subcatchment 2S: developed conditions**

Runoff = 4.05 cfs @ 12.07 hrs, Volume= 0.280 af, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs

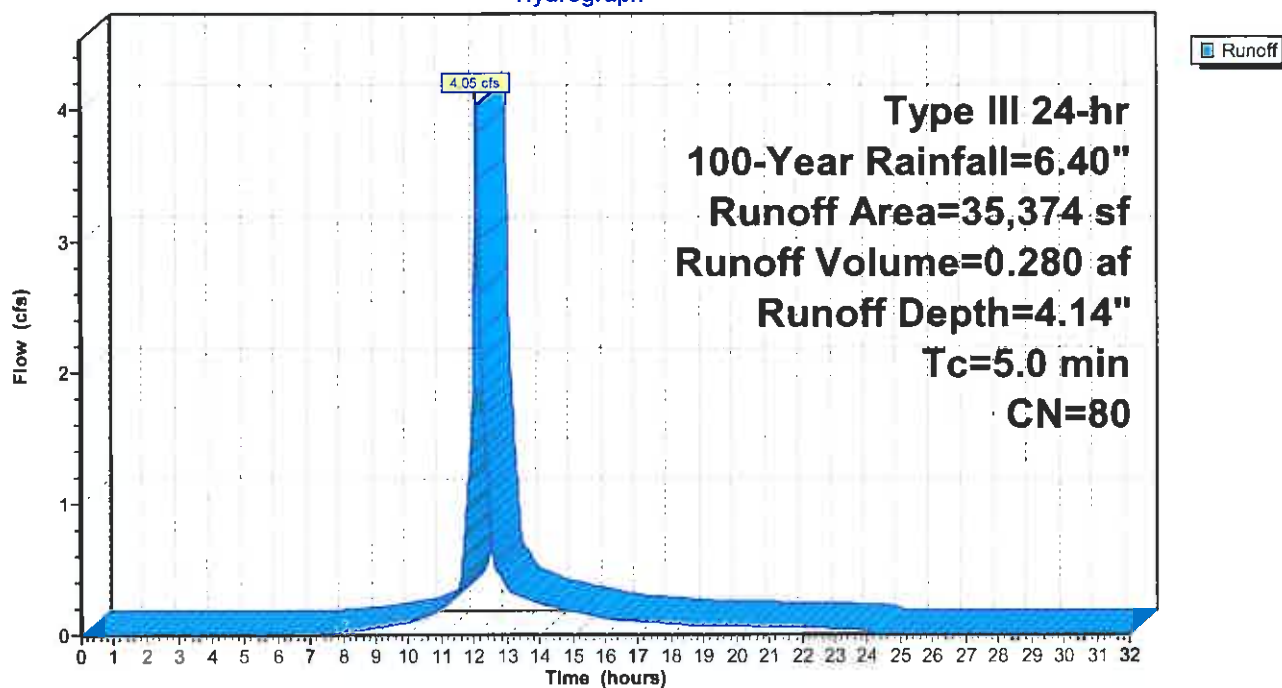
Type III 24-hr 100-Year Rainfall=6.40"

	Area (sf)	CN	Description
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	35,374	80	Weighted Average
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	24,594		69.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment 2S: developed conditions**

Hydrograph





United States  
Department of  
Agriculture

**NRCS**

Natural  
Resources  
Conservation  
Service

A product of the National  
Cooperative Soil Survey,  
a joint effort of the United  
States Department of  
Agriculture and other  
Federal agencies, State  
agencies including the  
Agricultural Experiment  
Stations, and local  
participants

# Custom Soil Resource Report for Hampshire County, Massachusetts, Central Part



August 7, 2014

# Preface

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Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# How Soil Surveys Are Made

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Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

## Custom Soil Resource Report

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map



































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The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

## Soil Map



MAP LEGEND

Area of Interest (AOI)		Spot Area	
	Area of Interest (AOI)		Spot Area
Soils			Stony Spot
	Soil Map Unit Polygons		Very Stony Spot
	Soil Map Unit Lines		Wet Spot
	Soil Map Unit Points		Other
Special Point Features		Special Line Features	
	Blowout	Water Features	
	Borrow Pit		Streams and Canals
	Clay Spot	Transportation	
	Closed Depression		Rails
	Gravel Pit		Interstate Highways
	Gravelly Spot		US Routes
	Landfill		Major Roads
	Lava Flow		Local Roads
	Marsh or swamp	Background	
	Mine or Quarry		Aerial Photography
	Miscellaneous Water		
	Perennial Water		
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hampshire County, Massachusetts, Central Part  
Survey Area Data: Version 8, Dec 17, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 28, 2011—May 12, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Hampshire County, Massachusetts, Central Part (MA609)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
745C	Hinckley-Merrimac-Urban land complex, 3 to 15 percent slopes	7.0	100.0%
Totals for Area of Interest		7.0	100.0%

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

## Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Hampshire County, Massachusetts, Central Part

### 745C—Hinckley-Merrimac-Urban land complex, 3 to 15 percent slopes

#### Map Unit Setting

*National map unit symbol:* 9b0c  
*Elevation:* 0 to 1,000 feet  
*Mean annual precipitation:* 40 to 50 inches  
*Mean annual air temperature:* 45 to 52 degrees F  
*Frost-free period:* 120 to 240 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Hinckley and similar soils:* 30 percent  
*Urban land:* 25 percent  
*Merrimac and similar soils:* 25 percent  
*Minor components:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Hinckley

##### Setting

*Landform:* Outwash plains  
*Landform position (two-dimensional):* Footslope  
*Landform position (three-dimensional):* Tread, riser  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Parent material:* Loose sandy and gravelly glaciofluvial deposits

##### Typical profile

*H1 - 0 to 8 inches:* loamy sand  
*H2 - 8 to 13 inches:* loamy sand  
*H3 - 13 to 29 inches:* gravelly sand  
*H4 - 29 to 60 inches:* Error

##### Properties and qualities

*Slope:* 3 to 8 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Excessively drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 20.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water storage in profile:* Low (about 3.6 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 3s  
*Hydrologic Soil Group:* A

#### Description of Merrimac

##### Setting

*Landform:* Outwash plains

## Custom Soil Resource Report

*Landform position (two-dimensional):* Footslope

*Landform position (three-dimensional):* Tread, riser

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Friable loamy eolian deposits over loose sandy glaciofluvial deposits derived from granite and gneiss

### Typical profile

*H1 - 0 to 16 inches:* gravelly fine sandy loam

*H2 - 16 to 24 inches:* gravelly sandy loam

*H3 - 24 to 60 inches:* stratified sand to very gravelly sand

### Properties and qualities

*Slope:* 3 to 8 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Somewhat excessively drained

*Runoff class:* Low

*Capacity of the most limiting layer to transmit water (Ksat):* High (2.00 to 6.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water storage in profile:* Low (about 5.4 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 2s

*Hydrologic Soil Group:* A

### Description of Urban Land

#### Setting

*Parent material:* Paved/fill

### Minor Components

#### Agawam

*Percent of map unit:* 4 percent

#### Ninigret

*Percent of map unit:* 4 percent

#### Sudbury

*Percent of map unit:* 4 percent

#### Windsor

*Percent of map unit:* 4 percent

#### Walpole

*Percent of map unit:* 4 percent

*Landform:* Terraces

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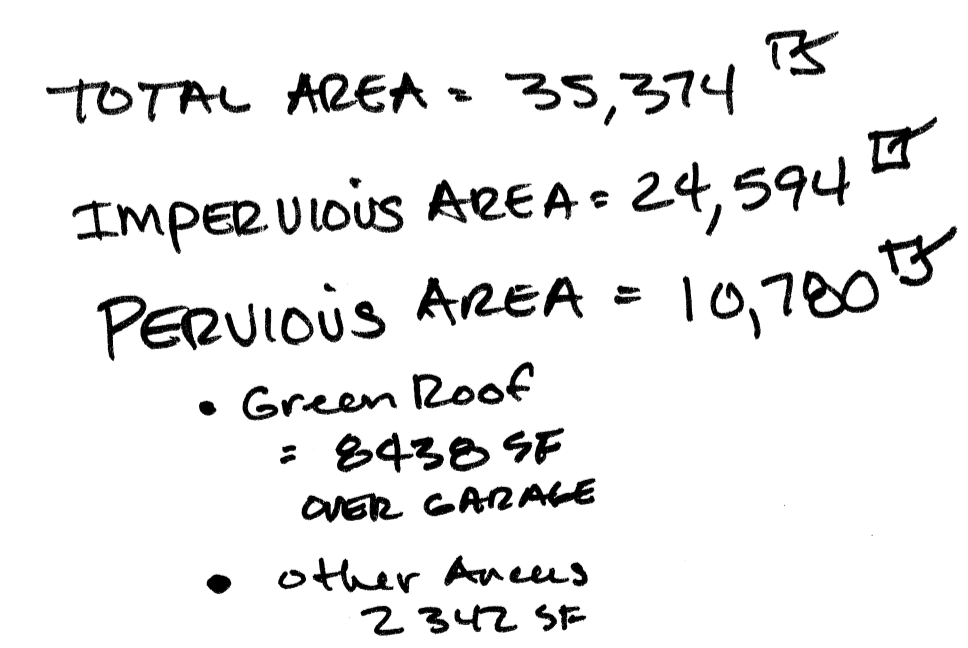
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